

## Briefing

**5+ years' experience in developing distributed systems and hacking source codes of open-sourced distributed systems (e.g., Hadoop). Familiar with C, C++, Python and Java programming in Linux/Unix environments.**

## Working Experience

2016–Now **Researcher**, *Huawei Future Network Theory Laboratory*.

2015–2016 **Postdoctoral Fellow**, *Department of Computer Science and Engineering*, Chinese University of Hong Kong.

**Interests:** Big data storage and processing, In-memory storage

## Education

2011–2015 **PhD**, *Computer Science and Engineering*, Chinese University of Hong Kong.

**Thesis Title:** Enabling Efficient and Dependable Clustered File Systems through New Erasure Coding Techniques

2007–2011 **Bachelor of Engineering**, *Computer Science and Technology*, University of Science and Technology of China.

## Projects and Open Source Softwares

2016 **Repair Pipelining for Erasure-Coded Storage**

**My contribution:** Full design and implementation

**Briefing:** Repair pipelining is a middleware sit on top of distributed file systems (e.g., HDFS, QFS). By fully utilizing network resources, it reduces repair time of erasure-coded storage system by over **90%**.

**Project website:** will appear after paper getting accepted.

2016 **ADN (Application-Driven Network) Prototype**

**My contribution:** Lead design and implementation of control plane

**Briefing:** ADN provides improved QoS guarantee by serving differentiated applications with dynamically-allocated network resources as well as dedicated transmission protocols.

2015 **Recovery-Oriented STAIR Codes in Storage Clusters**

**My contribution:** Lead implementation

- Briefing:** R-STAIR code is a storage-efficient code achieves high recovery performance for single failures as well as tolerance for burst failures. R-STAIR code outperform the state-of-the art coding schemes (proposed by Facebook and Microsoft) by **3.6×** in the single failure recovery performance.  
**Project website:** <http://ansrlab.cse.cuhk.edu.hk/software/rstair/>  
**GitHub repository:** <https://github.com/rhli/hadoop-rstair/>
- 2015 **EAR: Encoding-Aware Replication in Clustered File Systems**  
**My contribution:** Full design and implementation  
**Briefing:** EAR enables efficient and reliable transition from replication to erasure coding. EAR boosts encoding performance by up to **120%** compared with conventional random replication.  
**Project website:** <http://ansrlab.cse.cuhk.edu.hk/software/ear/>  
**GitHub repository:** <https://github.com/rhli/hadoop-EAR/>
- 2014 **Degraded-First Task Scheduler for MapReduce in Erasure-Coded Storage Clusters**  
**My contribution:** Full design and implementation  
**Briefing:** Degraded-First scheduler optimizes MapReduce performance in presence of component failures. It reduces the runtime of MapReduce job by up to **48%**.  
**Project website:** <http://ansrlab.cse.cuhk.edu.hk/software/dfs/>  
**GitHub repository:** <https://github.com/rhli/Degraded-First-Scheduler/>
- 2013 **CORE: Regenerating-Coding-Based Recovery for Single and Concurrent Failures**  
**My contribution:** Lead full design and implementation  
**Briefing:** CORE optimizes multi-node failure recovery of regenerating codes. The recovery throughput can be as high as **2.33×** that of widely deployed RS codes.  
**Project website:** <http://ansrlab.cse.cuhk.edu.hk/software/core/>
- 2011 **NCFS: Network-Coding-Based Distributed File System**  
**My contribution:** Implementation in file system layer  
**Briefing:** NCFS is a proof-of-concept prototype of a Network-Coding-based Distributed File System. NCFS is a proxy-based file system that interconnects multiple storage nodes.  
**Project website:** <http://ansrlab.cse.cuhk.edu.hk/software/ncfs/>

---

## Publications

- 2017 Runhui Li, Xiaolu Li, Patrick P. C. Lee and Qun Huang  
**Repair Pipelining for Erasure-Coded Storage.**  
 The 2017 USENIX Annual Technical Conference (ATC'17), Santa Clara, California, July 2017
- 2017 Eman Ramadan, Arvind Narayanan, Zhi-Li Zhang, Runhui Li and Gong Zhang  
**BIG Cache Abstraction for Cache Networks.**  
 The 37th IEEE International Conference on Distributed Computing Systems (ICDCS'17), Atlanta, Georgia, June 2017

- 2017 Runhui Li, Yuchong Hu and Patrick P. C. Lee  
**Enabling Efficient and Reliable Transition from Replication to Erasure Coding for Clustered File Systems.**  
 Transaction on Parallel and Distributed Systems (TPDS) (to appear)
- 2015 Mingqiang Li, Runhui Li and Patrick P. C. Lee  
**Relieving Both Storage and Recovery Burdens in Big Data Cluster with R-STAIR Code.**  
 2015 USENIX Annual Technical Conference (ATC'15) (Poster presentation), Santa Clara, CA, July 2015
- 2015 Runhui Li, Jian Lin and Patrick P. C. Lee  
**Enabling Concurrent Failure Recovery for Regenerating-Coding-Based Storage Systems: From Theory to Practice.**  
 IEEE Transaction on Computers (TC), 64(7), pp. 1898-1911, July 2015
- 2015 Runhui Li, Yuchong Hu and Patrick P. C. Lee  
**Enabling Efficient and Reliable Transition from Replication to Erasure Coding for Clustered File Systems.**  
 Proceedings of 45th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN'15) (Regular paper), Rio de Janeiro, Brazil, June 2015 (AR:  $50/229 = 21.8\%$ )
- 2015 Runhui Li and Patrick P. C. Lee  
**Making MapReduce Scheduling Effective in Erasure-Coded Storage Clusters.**  
 Proceedings of the 21st IEEE International Workshop on Local and Metropolitan Area Networks (LANMAN'15) (Invited paper), Beijing, China, April 2015
- 2014 Runhui Li, Patrick P. C. Lee and Yuchong Hu  
**Degraded-First Scheduling for MapReduce in Erasure-Coded Storage Clusters.**  
 Proceedings of 44th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN'14) (Regular paper), Atlanta, Georgia, June 2014 (AR:  $56/181 = 30.9\%$ )
- 2014 Silei Xu, Runhui Li, Patrick P. C. Lee, Yunfeng Zhu, Liping Xiang, Yinlong Xu and John C. S. Lui  
**Single Disk Failure Recovery for X-Code-Based Parallel Storage Systems.**  
 IEEE Transaction on Computers (TC), 63(4), pp. 995-1007, April 2014
- 2013 Runhui Li, Jian Lin and Patrick P. C. Lee  
**CORE: Augmenting Regenerating-Coding-Based Recovery for Single and Concurrent Failures in Distributed Storage Systems.**  
 Proceedings of 29th IEEE Conference on Massive Data Storage (MSST'13) (Short paper), Long Beach, CA, May 2013 (AR:  $(14 + 15)/109 = 26.6\%$ )
- 2011 Liping Xiang, Yinlong Xu, John Lui, Qian Chang, Yubiao Pan and Runhui Li  
**A Hybrid Approach to Failed Disk Recovery Using RAID-6 Codes: Algorithms and Performance Evaluation.**  
 ACM Transaction on Storage, 7(3):11, Oct 2011

---

## Honors and Awards

- 2015 The 45th IEEE/IFIP DSN Conference Student Travel Grant
- 2014 The 44th IEEE/IFIP DSN Conference Student Travel Grant
- 2011-2015 CUHK Postgraduate Studentship
- 2011 Undergraduate Excellent Thesis Award of USTC
- 2010 Citigroup Scholarship
- 2010 Excellent Thesis Award of Undergraduate Student Research Project of USTC
- 2009 Excellent Student Scholarship
- 2008 Excellent Student Scholarship
- 2007 Excellent Freshman Scholarship

---

## Reference (Available upon Request)

### **Prof. Patrick P. C. Lee (Supervisor)**

Department of Computer Science and Engineering,  
The Chinese University of Hong Kong  
E-mail: [pclee@cse.cuhk.edu.hk](mailto:pclee@cse.cuhk.edu.hk)

### **Prof. John C. S. Lui**

Department of Computer Science and Engineering,  
The Chinese University of Hong Kong  
E-mail: [cslui@cse.cuhk.edu.hk](mailto:cslui@cse.cuhk.edu.hk)